• COLORADO RIVER •

AQUEDUCT NEWS

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Vol. V OCTOBER 10, 1938 No. 19

Will Fox, M.W.D. staff photographer, went "arty" on this one and used the cloud effect as a background to picture the process of unloading steel ribs for the San Jacinto tunnel.

• COLORADO RIVER •
AQUEDUCT NEWS
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

306 West Third St.
Los Angeles, California

Published twice monthly in the interest of Field and Office Workers on the Colorado River Aqueduct, and for the information of all other citizens of the Metropolitan Water District.

Vol. 5 October 10, 1938 No. 19

Bids Opened For Construction Of Schedules 24 and 25

Bids were opened on October 4, 1938, for the construction of distribution schedules Nos. 24 and 25 which will constitute the lower end of the Palos Verdes feeder and will contain approximately 13.5 miles of pipe lines.

Eight contractors submitted proposals for the construction of this line, the specifications for which provide for alternate bids on (1) steel pipe, lined with spun mortar and coated with gunite; and, (2) precast concrete pipe with steel cylinder and bar reinforcement. The first type is known as "SC" and the second type is known as "P".

Final analysis of the bids had not been completed at the time this issue of the NEWS went to press, and the award on the contract will be announced at a later date.

Based on their total bid prices, the three low proposals were as follows:

Emsco Derrick and Equipment Company of Los Angeles, for Schedule 24SC, $549,628, and for Schedule 25SC, $542,107.

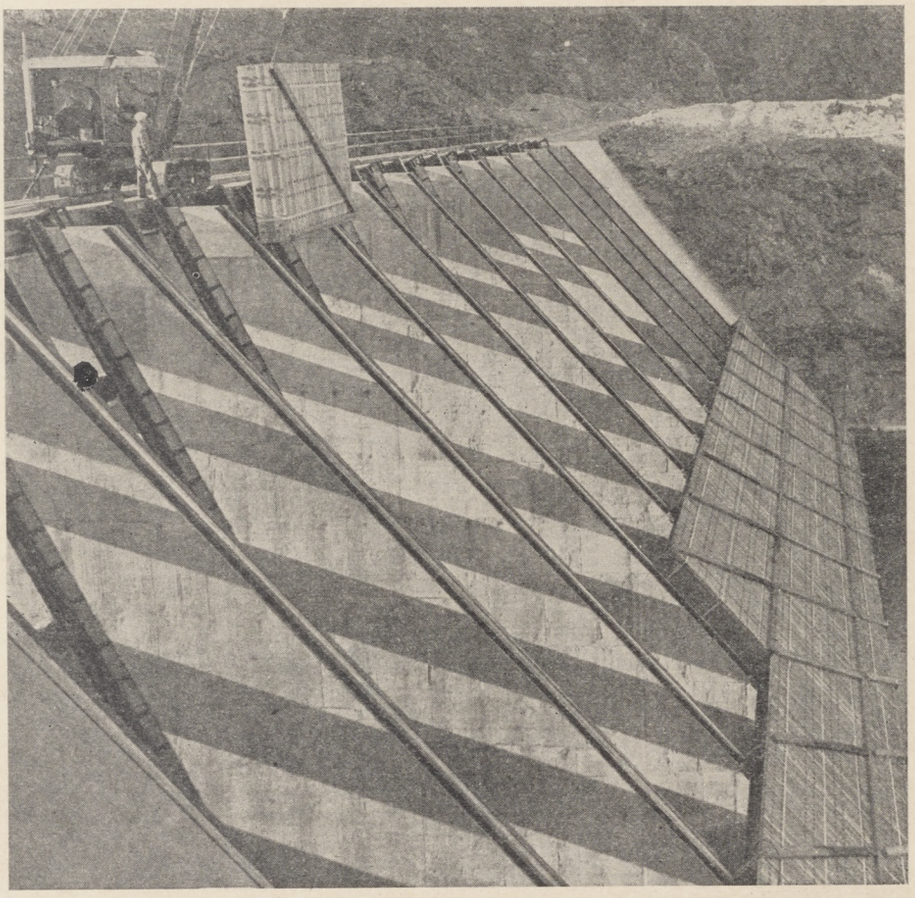
American Concrete and Steel Pipe Company of Los Angeles, for Schedule 24P, $532,709.

United Concrete Pipe Corporation of Torrance, for Schedule 25P, $498,592.

The Metropolitan Water District will furnish the cement to be used for either type of pipe line construction.

Extending south and west from 98th Street and Wadsworth Avenue in Los Angeles the new line will carry water to be delivered to Compton, Torrance, Long Beach, and the Los Angeles Harbor area, and will have an inside diameter of 50 inches.

The J. F. Shea Company, Inc., is now constructing the northern part of this cross feeder.



Placing a steel and timber bulkhead on the upstream face of the trash rack back of Parker Dam. The trash rack leads into the forebay for the power plant to be built as a future development.

– DIRECTORY –

BOARD OF DIRECTORS

W. P. Whitsett, Chairman
Franklin Thomas, Vice-Chairman
S. H. Finley, Secretary

Anaheim.....E. P. Hapgood
Beverly Hills.....Arthur Taylor
Burbank.....J. L. Norwood
Compton.....Warren W. Butler
Fullerton .....Walter Humphreys
Glendale .....Herman Nelson
Long Beach.....William M. Cook
Los Angeles.....Perry H. Greer
Los Angeles.....Otto J. Emme
Los Angeles..Louis S. Nordlinger
Los Angeles.....D. W. Pontius
Los Angeles.....John R. Richards
Los Angeles....Victor H. Rossetti
Los Angeles.....W. P. Whitsett
Pasadena .....Franklin Thomas
San Marino.....J. H. Ramboz
Santa Ana.....S. H. Finley
Santa Monica.....Arthur P. Creel
Torrance.....Charles T. Rippy

Charles H. Toll, Treasurer
D. W. Pontius, Controller

GENERAL STAFF

General Manager and Chief Engineer.....F. E. Weymouth
Asst. General Manager.....J. L. Burkholder
Asst. Chief Engineer.....Julian Hinds
General Counsel.....James H. Howard
Asst. General Counsel.....Arthur A. Weber
Asst. Controller.....J. M. Luney
Chief Elec. Engineer.....J. M. Gaylord
Asst. to Gen. Mgr., Don J. Kinsey
Secy. to Gen. Mgr.....Elisabeth von Hagen

DIVISION ENGINEERS

Distribution.....R. B. Diemer
Transmission....Robert N. Allen
Maintenance.....W. J. Neale

SUPERINTENDENTS OF CONSTRUCTION PUMPING PLANTS

Intake and Gene.....T. T. Walsh
Iron Mt. .....B. H. Martin
Eagle Mt. and Hayfield.....R. C. Booth

SUPERINTENDENTS

(Main Aqueduct Tunnels)

San Jacinto Tunnel, District Force Acct., B. C. Leadbetter, Gen. Supt.; S. J. Shrode and C. E. Sides, Tunnel Supts.; Chas. F. Thomas, Jr., Edwin Noon, Supts.; F. A. Backman, Gen. Foreman.

(Distribution Tunnels)

Monrovia Tunnels Nos. 1, 2 and 3, West Construction Co., H. E. Carleton, Gen. Supt.; E. M. Penn, Concrete Supt.

(Distribution Pipe Line)

Schedules 9P, 10P, 11P, United Concrete Pipe Corp., Roy Richards, Construction Supt.

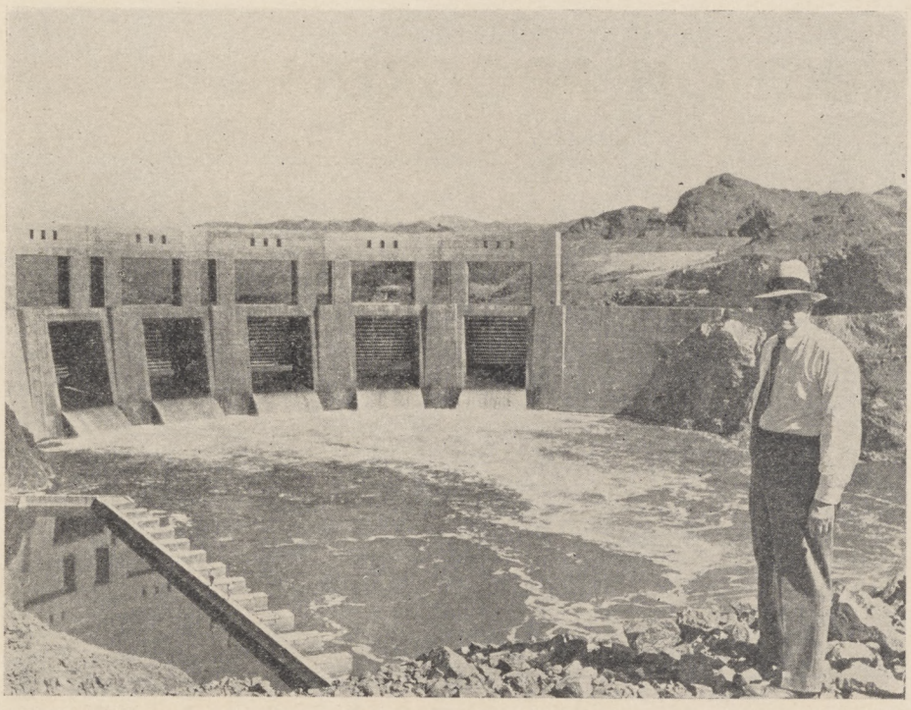
Schedules 8C, 9C, 12C, Basich Bros., Nick Basich, Gen. Supt.

Schedules 21SC, 22SC, 23SC, J. F. Shea Co., Gilbert J. Shea, Gen. Mgr.; C. A. Shea, Jr., H. F. Rennebohm, Supts.

Distribution Headworks, The Contracting Engineers Co.; Julian Huddelston, Supt.

(Dams)

Parker Dam, J. F. Shea Co., Frank Crowe, Gen. Supt.; H. P. Bunger, Constr. Eng., U.S.B.R.



General Manager F. E. Weymouth on the California bank of the Colorado River during an inspection trip to Parker Dam on October 3.

Hardrockers Making Big Yardage Against Old Man of Mountain

Entering into the fall football spirit, San Jacinto tunnel crews are inside the twenty-yard line and are making yardage with every push. After a five-year battle with the old man of the mountain, during which the enemy brought them to a standstill on a number of occasions, the hardrockers are really in pay dirt now and are making a driving finish for the goal.

Progress reports for the period ending October 8 show that only 1969 feet remain to be driven between the Lawrence and Potrero headings. During the first eight days of October, the two headings were advanced 419 feet at an average of 52.4 feet per day. On October 4, the crews put on a couple of fancy line bucks which netted them 63 feet on that 24-hour series of downs.

During the latter part of September and the first week in October the ground was unsupported in both headings, and both working faces were dry. The present burst of speed started during the middle of September and from September 15 to 30, inclusive, the total progress averaged 42 feet per day, increasing another 10 feet per day during the first part of October. The total progress for the month of September was 1128 feet.

The play-by-play report from the scene of action shows that the team averages for the first eight days of October were as follows: Lawrence, 27.4 feet; Potrero, 25.0 feet.

October Ends 15th Year of Work on Aqueduct Project

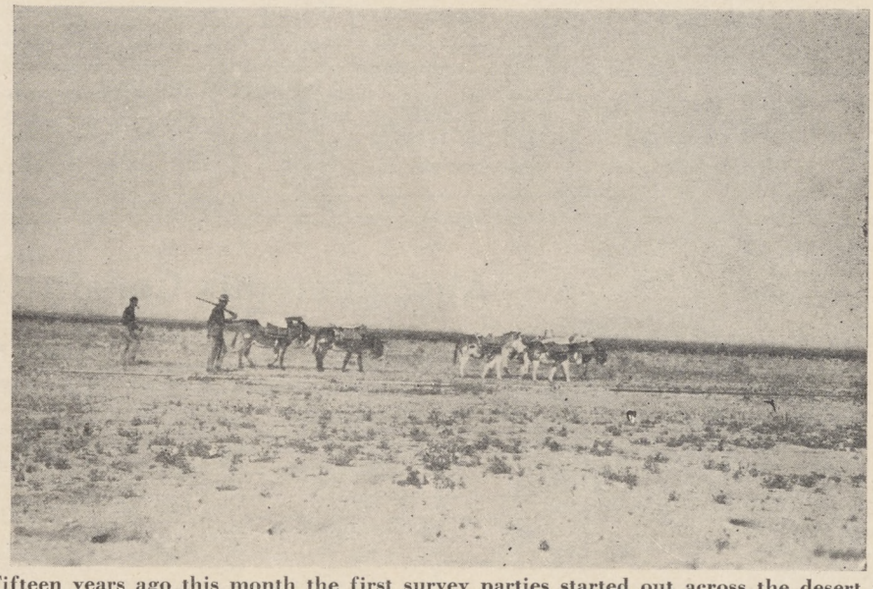
October, 1938, marks the fifteenth anniversary of the start of work on the job of bringing a part of the Colorado River, across three hundred miles of mountains and deserts, to provide an abundant, controlled, and everlasting supply of water for thirteen cities on the coastal plain of Southern California.

In October, 1923, the first engineering studies and investigations were begun, and the first survey parties started out into the desert to find a route for the Colorado River Aqueduct. This original work was carried on by the Water Bureau of the City of Los Angels, and the list of "old-timers" that has been published in recent issues of the NEWS reveals that many men are still working on the job who started out on the preliminary surveys.

In 1923, much of the area between San Bernardino and the Colorado River was unsurveyed, and there was no well defined belt, which was clearly better than any other area, to which aqueduct surveys might be confined.

Because the problem was so extensive, and there were so many possibilities as to where the line might be located, it was necessary to make a general topographic survey of a vast area covering 24,656 square miles.

The work was carried on by the City of Los Angeles from 1923 to 1930 when it was taken over by the District. Approximately eight years were required to complete these preliminary engineering studies. Actual construction work on the aqueduct itself was started in December, 1932. At the present time the entire project is more than 85 per cent completed, and is expected to be finished in 1939.



Fifteen years ago this month the first survey parties started out across the desert to find a route for the Colorado River Aqueduct. This old picture, taken from the District's files, shows survey transportation as it was in the 1920's.

CONSTRUCTION PROGRESS

September 16 to 30, 1938

SUMMARY

TUNNEL (MILES)	EXCAVATION Completed	EXCAVATION Remaining	LINING Completed	LINING Remaining
Aqueduct	91.66	0.45	86.11	6.00
Distribution	16.36	0.31	16.31	0.32
Total	108.02	0.76	102.42	6.32

CANAL, CONDUIT AND SIPHON (MILES)	Completed	Remaining
Excavation	145.60	0.01
Concrete	144.42	0.14
Backfill	80.70	0.14

DISTRIBUTION PIPE LINE (MILES)	Completed	Remaining
Excavation	58.78	4.42
Concrete	58.70	4.50
Backfill	56.33	6.87

TUNNELS

AQUEDUCT

CONTRACTOR	TUNNEL	LENGTH IN FEET	EXCAVATION IN FEET: NUMBER OF SHIFTS	AVERAGE PER SHIFT	THIS PERIOD	TOTAL TO DATE	REMAINING	LINING IN FEET: ARCH OR INVERT	NUMBER OF SHIFTS	AVERAGE PER SHIFT	THIS PERIOD	TOTAL TO DATE	REMAINING
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA	SAN JACINTO										*0	(37,147)	(31,696)
	Cabazon Shaft to East Portal	8,880		Completed		8,880	0	Arch	0	0	0	8,484	396
								Invert	0	0	0	8,484	396
	Cabazon to Lawrence	26,809		Completed		24,158		Arch	0	0	0	6,973	19,836
	Lawrence to Cabazon			Completed		2,651	0	Invert	0	0	0	6,972	19,837
	Lawrence to Potrero	17,672	45	7.9	355	2,999	2,388						
	Potrero to Lawrence		45	6.2	279	12,285		Arch	0	0	0	5,802	11,870
								Invert	0	0	0	7,837	9,835
	Potrero Shaft to West Portal	15,482		Completed		15,482	0	Arch	0	0	0	15,482	0
								Invert	0	0	0	15,482	0
	TOTALS Ft.	68,843	90	7.0	634	66,455	2,388	Arch			0	36,741	32,102
	Miles	(13.04)			(0.12)	(12.59)	(0.45)	Invert	0	0	0	38,775	30,068

*Invert considered to equal 0.2 and arch 0.8 of completed section.

DISTRIBUTION

WEST CONSTRUCTION CO.	MONROVIA NO. 3	32,105		Completed		32,105	0				0	32,095	0
J. F. SHEA CO., INC.	ROCKDALE (Schedule 21SC)	262			0	262	0				0	262	0
	OAKHILL (Schedule 21SC)	597			0	597	0		15	36.0	540	540	57
	ASCOT (Schedule 21SC)	1,622			0	0	1,622				0	0	1,622
	TOTALS Ft.	34,586			0	32,964	1,622		15	36.0	540	32,897	1,679
	Miles.	(6.55)			0	(6.24)	(0.31)				(0.10)	(6.23)	(0.32)

Canal, Conduit, Siphon and Pipe Lines

AQUEDUCT

SCHED. NO.	CONTRACTOR	FEATURES	Length In Feet	EXCAVATION—Feet: Period	To Date	Remain'g	CONCRETE—Feet: Period	To Date	Remain'g	BACKFILL—Feet: Period	To Date	Remain'g
20 A & B	M. W. D.—FORCE ACCT.	Siphon	752	0	705	47	0	0	752	0	0	752

DISTRIBUTION PIPE LINES

9-P	UNITED CONC. PIPE CORP.	Precast Concrete Pipe	8,697	0	8,697	0	0	8,697	0	0	8,697	0
8C-9C-12C	BASICH BROTHERS	Cast-in-Place Conc. Pipe	1,656	0	1,444	212	0	1,444	212	0	1,014	642
21SC	J. F. SHEA CO., Inc	Welded Steel Pipe	26,449	1,380	23,617	2,832	2,531	22,957	3,492	909	14,179	12,270
22SC			28,310	3,522	8,006	20,304	3,545	8,251	20,059	4,020	4,965	23,345
23SC			34,358	0	34,358	0	0	34,358	0	0	34,358	0
	TOTALS		99,470	4,902	76,122	23,348	6,076	75,707	23,763	4,929	63,213	36,257

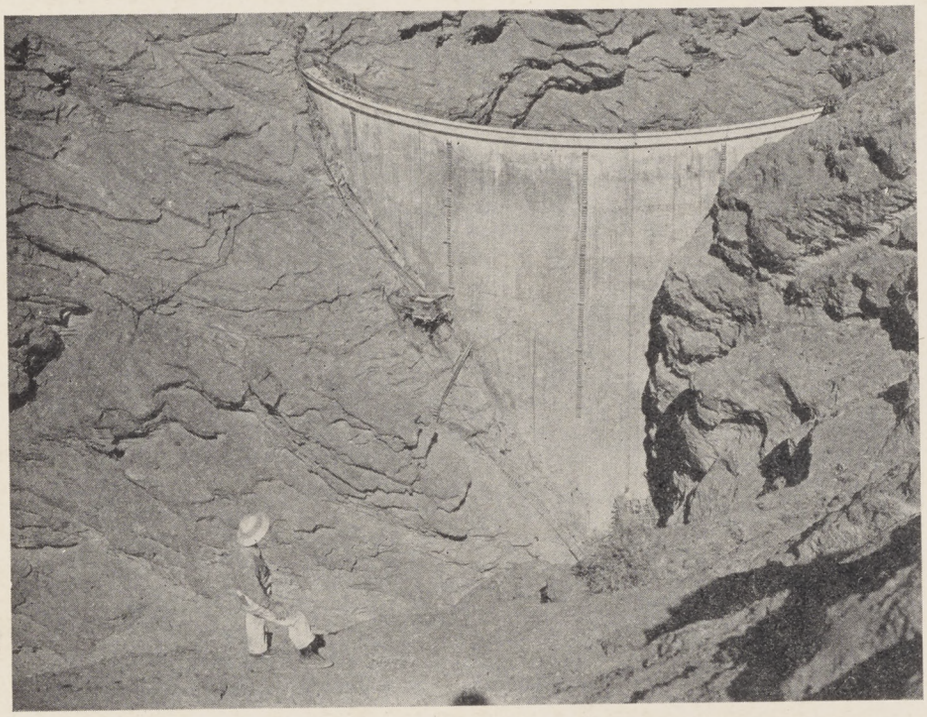
Miscellaneous Construction

PARKER RESERVOIR—SIX COMPANIES, INC.

FEATURES	Est. Quan.	Period	To Date	Per Cent.
Diversion Tunnels—Excav.	3,463 Ft.	0	3,463	100
Diversion Tunnels—Concrete	3,363 Ft.	0	3,363	100
Cofferdams—Excav.	227,582 C.Y.	0	227,582	100
Cofferdams—Fill	464,890 C.Y.	0	464,890	100
Outlet Works—Excav.	220,000 C.Y.	0	207,787	100
Outlet Works—Concrete	5,000 C.Y.	0	5,600	100
Dam—Excavation	1,502,200 C.Y.	0	1,526,726	100
Dam—Concrete	297,900 C.Y.	0	290,667	100
Power House—Excav.	58,000 C.Y.	0	67,894	100
Power House—Concrete	14,000 C.Y.	0	15,431	100

AQUEDUCT PUMPING PLANTS AND APPURTENANT WORKS

PLANT	CONTRACTOR	PER CENT COMPLETED: CONSTRUCTION	Installation of Equipment (Force Account)
INTAKE	WINSTON BROS. CO. & WILLIAM C. CROWELL	100	95
GENE		100	90
IRON MT.	WOOD & BEVANDA	100	97
EAGLE MT.	L. E. DIXON CO.	100	85
HAYFIELD	L. E. DIXON & CASE CONST. CO.	100	60



Recent view of the Copper Basin Dam as it appears today molded into the solid rock walls of the deep canyon which it blocks.

Water Tables Show Little Rise Despite Heavy Rains of 1938

(*Continued from September* 25)

By C. C. ELDER
Hydrographic Engineer, M.W.D.

Editor's Note: Rainfall in the Metropolitan area was 53% *above normal during the winter of* 1937-38. *As a result, the impression has arisen in some quarters that the drop of underground water levels has been temporarily stopped. However, careful study of underground water tables indicates that the heavy rains of last winter, and of the winter before, when rains were* 49% *above normal, have had little effect on the major underground water basins in this area.*

These conditions exist notwithstanding that the main Los Angeles wells in these areas have been but slightly pumped since 1931.

Records indicate that in the East Los Angeles-Vernon industrial areas water tables dropped from 10 to 17 feet from 1931 to 1937, despite the fact that pumping was materially reduced during the industrial shut-down of 1932-34. A recovery of 1.7 feet to 2.8 feet was observed in these areas after the heavy rains of 1937-38.

Near Anaheim, which is in the center of the Orange County basin as well as the center of the 1938 flood zone, an index well (with an observed record since 1898) only showed a rise of 4 feet for 1937-38, and a maximum water table elevation of 116 feet below the ground surface. The water surface in this same index well was but 23 feet below ground level in 1898, and but 36 feet in 1916, since which date the trend has been almost continuously downward in Orange County.

During the seasons of 1937 and 1938, a normal three-year rainfall occurred during a period of one and a half years, a condition not equaled as to sustained precipitation *since* 1889. In spite of this abnormal rainfall, the 1937-38 replenishment in most of the basins in the Metropolitan area was far *less* than the depletion in these same basins during the period 1931-36—a period which in itself had an average rainfall of 2% above normal. As a result all previous overdraft and drouth depletions *remain* as a regional liability.

With the resumption of normal rainfall, which must be anticipated, it appears that the general downward trend of the water tables will be inevitable except in those areas to be supplied with imported water.

Due to the lack of direct replenishment, the underground water tables in the areas south and southwest of Los

(*Continued on Page* 8)

Community Chest Drive Under Way

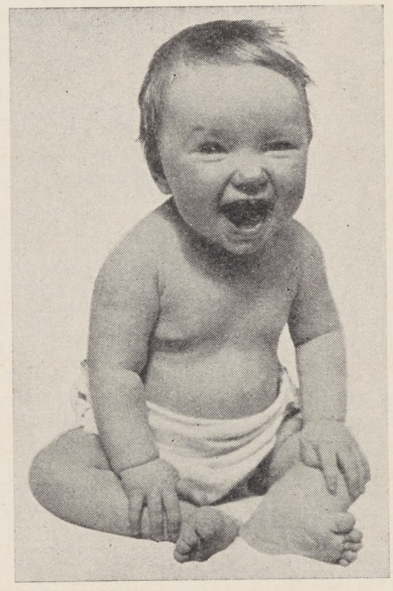
In line with its usual practice, The Metropolitan Water District of Southern California is giving its full cooperation to the annual Community Chest in the cities of the District. This year, as in the past, the Los Angeles Community Chest is acting as a medium of contact between these organizations and the District.

On each of the past annual Community Chest drives, those working on the aqueduct have maintained an enviable record in equalling or exceeding their quota. Indications from the field and office are that the same spirit of common endeavor is manifest this year among the aqueduct clan.

Employees making contributions to the Community Chest have the right to allocate their contributions to their home city. Special pledge cards have been provided for District employees, and these cards have a space where the employee may designate the city and charity to which the contribution is to be forwarded.

The Chest itself is not a charity group. Instead, it collects and distributes funds to 88 agencies, none of which receive governmental funds.

Analysis of the spending of funds collected by the Community Chest during past years has shown that more than 70 per cent of this money is spent for children.



This young man needs help—your contribution will keep the smile on his face.

Construction Water

Planning and Building the Construction Water Supply System for the Colorado River Aqueduct.

By O. J. SCHIEBER
Senior Engineer, M.W.D., 1931-1938

In the construction of the Colorado River Aqueduct across approximately 200 miles of desert from the Colorado River to Big Morongo Canyon, the provision of an adequate and dependable supply of water for domestic and construction use was a vital necessity. The provision of this water supply, equal to the requirements of a city of 15,000 people, in a desert area where only a few scattered springs and wells existed, was a task of considerable magnitude. It actually required the building of a miniature aqueduct before the main Aqueduct could be constructed.

Planning of the water system was based on providing a water supply sufficient to meet the maximum requirements of the construction program approved for the building of the Aqueduct. The quantities required at the various places of use were based on estimates of the domestic requirements for the personnel and the construction requirements for cooling of air compressors, operation of air drills, wetting of subgrade, mixing and curing of concrete, washing of aggregate, etc.

Comparative estimates were made of the cost of supplying the water from various sources along the aqueduct where there was reasonable assurance that wells could be developed based on the topography and the contributary drainage area. From this analysis a tentative plan was adopted based on supplying water from wells drilled at the more favorable locations.

Two well rigs were rented in December, 1932, and active drilling of wells was started and continued to completion in August, 1933. This drilling developed ten good wells with yields varying from 75 to 500 gallons per minute which were included in the final water system. These are located one each at Eureka, Earp, Sand Draw, Pinto Wash, Little Morongo Canyon and Big Morongo Canyon, and two each at Vidal Wash and Buried Mountain.

Use of wells at Indio was originally considered but this was abandoned when good wells were developed at Buried Mountain and the Monrovia canyons. The Morongo wells however showed rapid depletion and it was necessary in May, 1934, to supplement these wells with a supply from Covington Springs about 3¼ miles further up the Big Morongo Canyon. An additional well was required at both Eureka Wash and Earp and the well at Sand Draw, due to the poor quality of the water, was replaced by a new well.

The above wells were grouped into four separate sections. The wells in each section were connected by a steel pipe line which in general paralleled the Aqueduct and was designed of proper size and provided with the necessary booster pumps, storage tanks and reservoirs. Beginning at the river, the first section supplied water for the work from Parker Dam to Copper Basin, the second section the work from Whipple Mountain Tunnel to East Iron Mountain Tunnel, the third section the construction from West Iron Mountain Tunnel to Fargo Canyon and the fourth most westerly section the work from Berdoo Canyon to Big Morongo Canyon. During the season of heaviest construction on each section the following quantities of water were supplied: Section One, 400 gallons per minute; Section Two, 550 gallons per minute; Section Three, 900 gallons per minute, and Section Four, 325 gallons per minute.

The wells are 16 inches in diameter, lined with No. 8 gauge stovepipe casing for the deeper wells and 10 gauge casing for the shallow wells. They vary in depth from 26 feet to 785 feet, with the water level ranging from 11 feet to 314 feet. Production under steady pumping has varied from 50 gallons per minute for the Morongo wells to 500 gallons per minute for the Pinto well.

The pipe lines were constructed with standard O. D. line pipe 4 to 8 inches in diameter except for parts of the supply lines from the wells where heavier pipe was required due to higher heads. The pipe was supplied by the District in lengths averaging approximately 37 feet and the lines were constructed by contract. A trench with a minimum depth of 18 inches was excavated with graders, rooters, plows and bulldozers operated by tractors. The pipe was oxy-acetylene welded, tested to 500 pounds per square inch, and then lowered into the trench and backfilled with tractor-operated graders and bulldozers.

The well pumps, booster pumps and the smaller storage tanks were all installed by District crews. The gunite-lined reservoirs and the larger steel tanks were built by contract. The pumps are all electrically operated, power being supplied by stub lines from the District's 33-kv line with transformers at the pump sites which step the voltage down to 440 and 220 volts.

The booster pumps are of centrifugal type of various makes and sizes varying from a capacity of 150 gallons per minute at 200-foot head to 300 gallons per minute at 900-foot head. The well pumps are of the deep well turbine type with capacities varying from 150 to 750 gallons per minute and heads varying from 60 to 440 feet. All of the pumps are automatically operated.

The reservoirs and tanks located along the pipe lines provide storage to take care of breaks in the pipe lines or interruptions in the supply from the wells. Duplicate pump units are installed in all of the booster plants to insure continuous operation of these plants. The output of the well pumps and booster plants is all measured by flow meter and recorded by a Foxboro Automatic Recording Instrument. Water is metered to all users at the points of delivery on the District line.

The water supplied from the various wells has varied considerably in quality but has all been within the range of potability. All sources are tested at regular intervals, but no instances of contamination from bacillus coli have occurred. Some trouble was experienced at the Pinto and Morongo wells due to crenothrix in the water causing incrustation on the walls of the pipe line and a reddish discoloration of the water. This condition is corrected by aeration and chlorination of the water at the wells.

The complete water system consisting of 14 wells, 199 miles of pipe line, 20 booster tanks, 35 tanks and reservoirs and the necessary transmission line connections and transformers cost a total of $863,000. The nominal cost of 15 cents per 100 cubic feet charged by the District for water furnished to tunnel work and 30 cents per 100 cubic feet for the open work has been sufficient to take care of operation and maintenance to date and provide a credit of some $40,000.

Except for the additional wells required at the River and Sand Draw, and the development of Covington Springs, the water system has functioned very much as originally planned. During the busiest part of the Aqueduct construction work, from May to July, 1936, an average of 1,500,000 gallons of water was delivered each day, a quantity sufficient to supply the requirements of a city the size of Burbank.